submerged aquatic vegetation throughout most of the sampling period. Supersaturation occurs when the water holds more oxygen molecules than usual for a given temperature. Sunny days with lots of photosynthesis or turbulent water conditions can lead to supersaturation. A water sample is "saturated" at 100% and "supersaturated" above 100%.

Garvins Falls

Figures 4.2.3-5 through 4.2.3-7 display the dissolved oxygen values below Garvins Falls at Station #3. The data gap at the end of June was caused by a datasonde malfunction. Garvins Falls displayed the most unusual dissolved oxygen patterns of the four sites. Dissolved oxygen levels slowly decrease throughout June until early July when a more dramatic daily fluctuation is observed. Irregular daily patterns persisted for the remainder of the sampling season.

Hooksett

Figures 4.2.3-8 through 4.2.3-10 display the dissolved oxygen values below Hooksett tailrace (Station #5). Dissolved oxygen percent saturation at this site on occasion lacks a defined diurnal pattern similar to that of Garvins Falls. This is the case from the beginning of the study period on May 24, 2002 until early August. The data gap for the last week of August was due to a datasonde malfunction. After this event, dissolved oxygen levels appear to return to a daily fluctuating pattern. A clear example of calibration drift can be shown in Figure 4.2.3-9 during August. Three consecutive weekly logging runs slowly drift downward in a linear fashion, excluding diurnal cycles. Once the data is drift adjusted, a more stable pattern is evident. From September 13 – 23, dissolved oxygen percent saturation displays an unusual pattern. This is most likely due to low flows and high temperatures coupled with the fact that the datasonde at this station during this time period did not have a stirrer. If the water in the river was not moving at about one foot per second, the manufacturer recommends that a stirrer be used to prevent large measurement errors.

Amoskeag

Figures 4.2.3-11 through 4.2.3-13 display the dissolved oxygen percent saturation below the Amoskeag development (Station #7). Water at this station is fairly well oxygenated through May and June. The data gaps during June and July were the result of a datasonde malfunction. This station exhibits a more natural pattern of daily fluctuation in dissolved oxygen percent saturation for the remainder of July, however in August dissolved oxygen levels appear to fluctuate in a less gradual manner. An episode of data drift is evident from September 6 - 13. For the remainder of the study period, dissolved oxygen percent saturation stays relatively high with a less pronounced daily fluctuation than previously observed.

4.2.4 Average Daily Dissolved Oxygen Levels

The drift adjusted data were used to compute the average daily dissolved oxygen percent saturation at each station. These results are presented in Figures 4.2.4-1 through 4.2.4-4. The NHDES standard for dissolved oxygen levels that applies to the river in the vicinity of the Project is as follows, "Except as naturally occurs, ...class B waters shall have a dissolved oxygen content of at least 75% of saturation, based on a daily average and an instantaneous minimum dissolved oxygen concentration of at least 5 mg/L" (State of New Hampshire, Surface Water Quality Regulations, December 10, 1999).

Sewalls Falls

Figure 4.2.4-1 displays the average daily dissolved oxygen levels at Sewalls Falls from May 24 through October 14, 2002. Of the 130 days when the daily value could be calculated, the average daily value fell below the 75% standard 20 times, or 15 percent. This occurred six times in July and fourteen times in September. These events are significant when comparing violations of the average daily dissolved oxygen standard at the other three sampling stations because Station #1 represents inflow conditions to Project area.

Garvins Falls

Dissolved oxygen levels fell below the 75% standard on several occasions at Garvins Falls – the most out of all four sampling sites. Figure 4.2.4-2 shows that 44 percent of the time (60 of 136 days) average daily dissolved oxygen levels at Garvins Falls fell below 75%. On seven of the days, the average dissolved oxygen levels of the inflow at Sewalls Falls were below 75%. There were occasions, however when the average daily dissolved oxygen levels at Garvins Falls were above the standard when levels at Sewalls Falls were below the 75% standard.

Hooksett

The average daily dissolved oxygen levels at Hooksett improved significantly from those observed at Garvins Falls. Figure 4.2.4-3 shows the levels fell below the 75% standard on 13 occasions, less than 10 percent of the time, during the sampling period. Of those 13 days, dissolved oxygen levels were below the 75% standard at Sewalls Falls eight times. This leaves 5 of the 132 days during the sampling period below the standard.

Amoskeag

Dissolved oxygen levels at Amoskeag tailrace fell below the 75% standard only seven times during the 124 days in which data was gathered. This translates to approximately five percent of the time that levels fell below the state water quality standard. Figure 26 shows the average daily dissolved oxygen levels at Amoskeag tailrace. On all occasions when the daily average was below the 75% standard, inflow conditions at Sewalls Falls were above the 75% standard.

4.3 Conclusions

Temperature

Water temperatures below each development display a typical seasonal nature, gradually warming throughout the late spring and summer months, then decreasing in the autumn. Water temperatures at Sewalls Falls in general were the coolest throughout the sampling period. The Garvins Falls development seemed to have very little effect on water temperatures in its tailrace at Station #3. Water temperatures closely follow those observed at Sewalls Falls, with the exception that Sewalls Falls shows higher daily fluctuations in the warmer months than at Garvins Falls. This is most likely due to the depth of water at Sewalls Falls (less than 1 meter).

Water temperatures recorded in the Hooksett tailrace rise significantly compared with those observed at Garvins Falls. During the sampling period, the instantaneous differences in water temperature on average were over 2 °C warmer at Hooksett. The greatest difference in water temperature was over 5 °C warmer at Hooksett than at Garvins at the same time period. This occurred on September 16, 2002. The warmer water temperatures observed at Hooksett are likely due to the cooling water discharges into the river upstream of Hooksett at the Merrimack Station coal-fired power plant in Bow.